

[0021] The method may further include: switching the impedance measurer to a fourth mode; and measuring a fourth impedance value of the examinee when the impedance measurer operates according to the fourth mode, wherein when the impedance measurer operates according to the fourth mode, the current source is connected between the first electrode and the fourth electrode, and the voltmeter is connected between the second electrode and the fourth electrode, and the third electrode is electrically disconnected from the current source.

[0022] The method may further include: switching the impedance measurer to a fifth mode; and measuring a fifth impedance value of the examinee when the impedance measurer operates according to the fifth mode, wherein when the impedance measurer operates according to the fifth mode, the current source is connected between the first electrode and the third electrode, and the voltmeter is connected between the second electrode and the third electrode, and the fourth electrode is electrically disconnected from the current source.

[0023] The obtaining of the bio impedance of the examinee may include obtaining the bio impedance of the examinee by compensating for an effect of contact impedance values between the first, second, third and fourth electrodes and the surface of the examinee in the first, second, third, fourth and fifth impedance values.

[0024] The method may further include outputting bio information of the examinee based on the bio impedance of the examinee.

[0025] The bio information of the examinee may include at least one of a body fat amount of the examinee, a basal metabolic amount of the examinee, a skeletal muscle amount of the examinee, a blood flow amount of the examinee, a breathing rate of the examinee, a heart rate of the examinee, and heart rate variation of the examinee.

[0026] According to an aspect of another exemplary embodiment, a method of measuring a bio signal using a bio signal measuring apparatus includes: positioning electrodes included as part of the bio signal measuring apparatus to contact a surface of an examinee; switching an impedance measurer included as part of the bio signal measuring apparatus and including an amperemeter, a voltmeter, and a current source, to a first mode, the current source inducing an internal impedance; measuring, by using the amperemeter, a current amount supplied from the current source to the electrodes when the impedance measurer operates according to the first mode; determining a first impedance value of the examinee based on a current amount supplied to the electrodes and a voltage measured by the voltmeter when the impedance measurer operates according to the first mode; switching the impedance measurer to a second mode; measuring, by using the amperemeter, a current amount supplied from the current source to the electrodes when the impedance measurer operates according to the second mode; determining a second impedance value of the examinee based on a current amount supplied to the electrodes and a voltage measured by the voltmeter when the impedance measurer operates according to the second mode; and obtaining bio impedance of the examinee based on the first and second impedance values.

[0027] The method may further include outputting bio information of the examinee based on the bio impedance of the examinee.

[0028] According to an aspect of another exemplary embodiment, an apparatus configured to measure a bio signal includes an electrode unit including electrodes that contact a surface of an examinee; an impedance measurer including a voltmeter and a current source, the current source inducing an internal impedance; a mode controller configured to control the impedance measurer to measure a first impedance value of the examinee while the impedance measurer is operating according to a first mode, and measure a second impedance value of the examinee while the impedance measurer is operating according to a second mode; and a bio impedance obtainer configured to obtain bio impedance of the examinee based on the first and second impedance values and the internal impedance of the current source.

[0029] The electrode unit may further include a first electrode, a second electrode, a third electrode and a fourth electrode, and the mode controller may be configured to control the impedance measurer such that the current source is connected between the first electrode and the fourth electrode, and the voltmeter is connected between the second electrode and the third electrode when the impedance measurer operates according to the first mode.

[0030] The mode controller may be configured to control the impedance measurer such that the current source is connected between the first electrode and the fourth electrode, and the voltmeter may be connected between the second electrode and the third electrode, and the first electrode and the second electrode may be short-circuited, and the third electrode and the fourth electrode may be short-circuited, when the impedance measurer operates according to the second mode.

[0031] The bio impedance obtainer may be configured to obtain the bio impedance by compensating for an effect of contact impedance between the electrodes and the surface of the examinee in the first and second impedance values by considering the internal impedance of the current source.

[0032] The bio impedance obtainer may be configured to obtain the bio impedance by using Equation 1:

$$Z_m = Z_{AP} \frac{(\beta + Z_i)(\beta + Z_s)}{Z_{AP}(2\beta + Z_i + Z_s) + Z_i Z_s} \quad \text{Equation 1}$$

where β is defined by Equation 2,

$$\beta = \frac{2}{\frac{1}{Z_{2P}} - \frac{1}{Z_i} - \frac{1}{Z_s}} \quad \text{Equation 2}$$

where Z_{AP} =a first impedance value, Z_{2P} =a second impedance value, Z_i =an input impedance value of the impedance measurer, and Z_s =the internal impedance of the current source.

[0033] The impedance measurer may further include: a current source parallel impedance that is parallel-connected to the current source and which changes an effective value of the internal impedance of the current source.

[0034] The current source parallel impedance may have an impedance value that is less than the internal impedance of the current source.